

eCow pH Bolus User Guide



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1. Introduction

eCow pH Bolus

The eCow pH bolus is the market leader for longevity, size and stability of results in the area of dairy cow rumen monitoring.

The pH and temperature sensors reside in the punctured metal end cap. The bolus is uniquely weighted such that it stands upright in the rumen, thereby allowing for full immersion of the sensors and improved data readings.

At the top of the bolus there is a metal loop. This is included for the convenience of our research customers, allowing for easy retrieval of the bolus.

The inner workings of the bolus are securely encased in resin to protect them from the rumen liquor inside the cow. By default the bolus logs pH and temperature in 15 minute intervals which allows for 28 days of data to be stored on the bolus.

Thanks to years of research and innovation the eCow bolus has a lifespan of 5 – 6 months of continuous use when used correctly.



**eCow
farmBolus™**

eCow Handset

Downloading data from the bolus is very simple with the use of our bespoke software. The device consists of a Samsung SII phone and antenna which plugs in to the bottom of the phone.

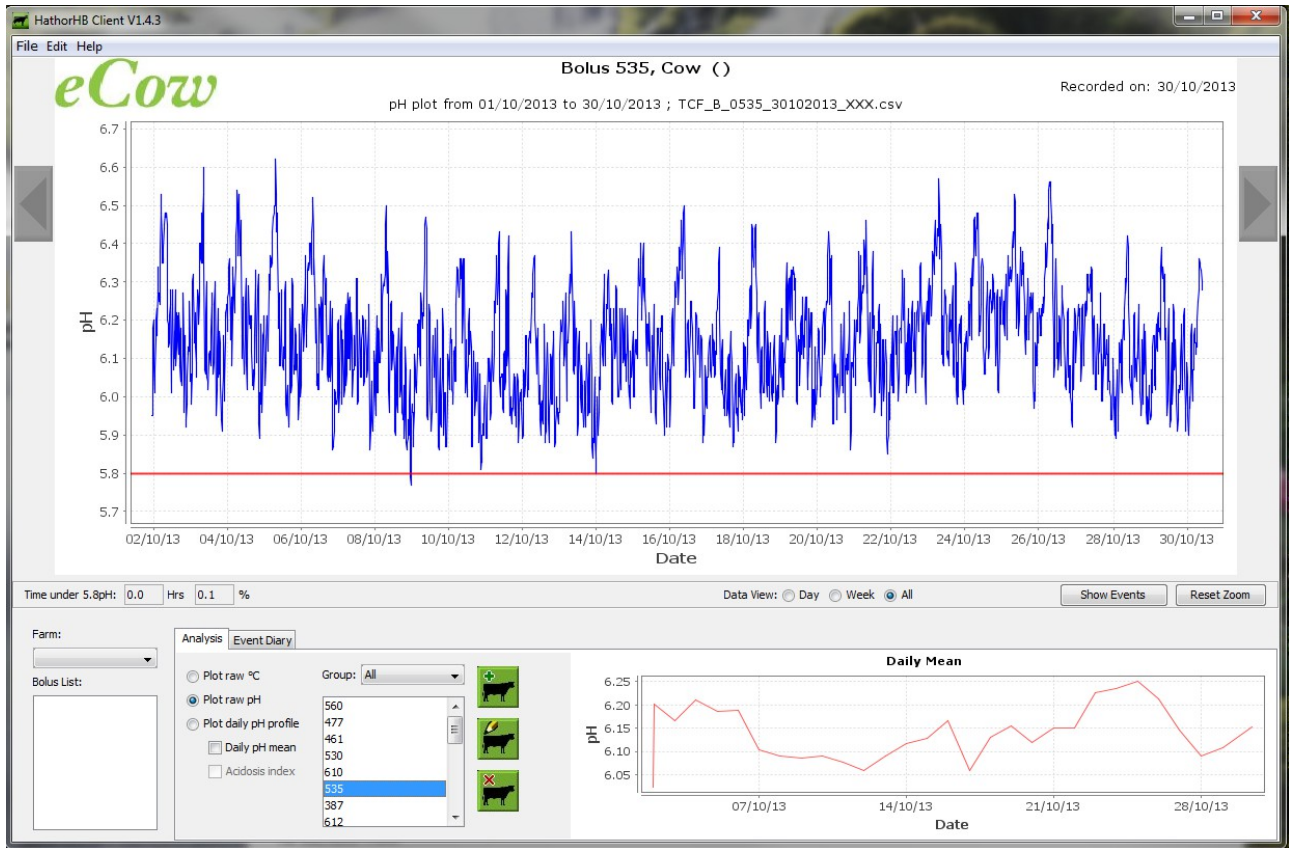
A data download typically takes between 1 to 3 minutes and once completed the data is automatically uploaded to the eCow servers where it is checked, analysed and made available to view through our new client software.

The handset may also be used to change bolus settings such as radio on time and calibration values.



**eCow
Handset**

Client Software



The eCow client software gives you easy access to your data. Available for Windows and Mac this software allows you to import data you have stored locally or login to view uploaded and archived data. Shown above is the raw pH data, however you can also view temperature and the cow's average daily pH profile.

2. Getting Started

You will receive your boluses in our customised protective packaging. There will be a small amount of water in the bottom of this box, this is to keep the sensor head hydrated. As such it is recommended that you keep this box upright. If you need to store the boluses please keep them in this box.

By default the boluses are shipped with a 24 hour radio on time window, unless you specify otherwise when you order. To maximise battery life it is recommended that you change this to a shorter time window to match when you will typically be performing downloads (more detail to follow).



Using the Handset

Your handset will be shipped ready for use, but will be off to conserve battery. To turn the handset on, apply pressure to the top right of the black case (as shown) until you see the Samsung Galaxy logo.

Connecting to WiFi

For full functionality the handset requires an internet connection.

Starting at the home screen (Press the home button at the bottom centre):

1. Tap "Settings"
2. Tap "Wi-Fi"
3. You should now see a list of available networks. If not, ensure that WiFi is turned on (slide the switch at the top right of the Wi-Fi page).
4. Select your network and enter your network passphrase when prompted

Your handset should now be connected to the internet.





Hathor

To start the download software (named Hathor), plug the micro usb wire that protrudes from the bottom into the socket at the bottom of the phone.

Upon plugging the wire in you will see the Hathor main page. At the top of this page there is a scrolling list of all the Boluses installed on the phone and underneath this there are 4 buttons.



- The down arrow is the **download button**. Pressing this button will start a download from the bolus highlighted at the top of the screen (Note: the boluses must be above 32°C for a download to be possible).
- The set of scales is the **calibration button**. Pressing this will take you to the bolus calibration screen.
- The gear is the **configuration button**. This button brings up the configuration screen.
- The graph axes represent the **data viewer**. Pressing this takes you to the data viewer function which allows you to preview your downloaded data on the phone.

The first step to take upon receipt of new boluses is to reconfigure the time window (unless you requested a specific time window when ordering). Before doing this it is important to ensure that the handset has the correct time settings

Setting the Date and Time

The handset will download the local date and time settings from the internet if it is able to

find them. If it cannot find them then you may input them manually by following these steps:

1. Press the home button to return to the home screen.
2. Tap “Settings”.
3. Scroll to the bottom of the list and tap “Date and Time” (fourth up from the bottom).
4. By default the phone will have the “Automatic date and time” option ticked. Underneath this option it displays what it thinks the correct date and time are. If the displayed date and time are correct then proceed no further, if not go on to step 5.
5. Untick the Automatic date and time box by tapping the tick.
6. Tap on Set date and Set time and change them to the correct values for your region.

Setting the radio Time Window

This is an important step in ensuring the long battery life of the bolus. The time window defines the period in which you will be able to communicate with the bolus during the day. All boluses are shipped with a 24hr time window by default. A time window of 9am – 5pm is typical with our existing nutritionist customers and this means that they are able to download from the boluses at any time within the hours of 9am to 5pm. With an 8 hour time window you can expect about 6 months battery life.

When outside of the time window it is not possible to communicate with the bolus at all. This means that it is crucial you do not accidentally set the wrong time window. For example, if one were to set a time window of 2am – 4am it would only be possible to reconfigure a more feasible time window between these hours.

As previously mentioned, the boluses automatically shut down when under 32°C. Therefore to communicate new configuration data to the boluses they must first be warmed. To achieve this:

1. Place your boluses into the storage box in which they were shipped. Then place this into an empty bucket
2. Fill the bucket with boiling water up to the fill line on the bolus storage box.
3. Wait for 5 – 10 minutes for the boluses to warm up

Warning – Never immerse an unprotected bolus in boiling water. The extreme temperature change will cause the glass of the pH sensor to crack, rendering the bolus useless.

Alternatively, you may use your cows as a heat source and change the Time windows whilst the boluses are in the cows. Please note that the



boluses will take up to an hour to warm up after being placed in a cow.

Once the boluses have warmed, to set the time window:

1. Press the **configuration button**.
2. You will now see a list of all the boluses installed on your handset. Tick the boxes next to the bolus numbers you wish to configure.
3. Tap "OK".
4. Tapping "Set Time Window Start Time" will bring up the time selection box. Swipe the time values up or down until they reach your desired time then tap "Set".
5. Tapping "Set Time Window Duration" brings up a list of possible time window durations. Select your desired duration then tap "OK".
6. Tap "Set" at the bottom left of the screen to send these new settings to the bolus and wait for the handset to say it has completed the process.

3. System Operation

Once the time windows have been configured your boluses are ready to be deployed and to start collecting data.

Bolus Deployment

The eCow pH bolus is deployed in the same manner as any other standard bolus. That is, orally with the use of a balling gun (available on the [eCow store](#)). Bolus deployment should be performed by someone with experience, a vet for example.

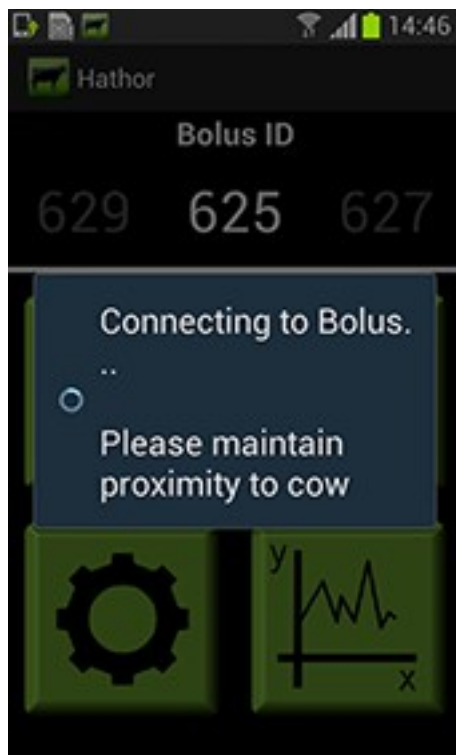
Once the bolus has been properly inserted it will take a few hours to settle into its resting place in the reticulum.

eCow does not warrant or encourage the use of its bolus in any animal other than cows.

Downloading and Uploading Data

Boluses must be downloaded from at least once every 28 days to prevent data loss. If left for longer than 28 days the bolus will overwrite the older values to accommodate the new data.

The following sections will first describe how to download data from a software point of view, then how best to handle the cow when downloading and finally an overview of the upload process.



Using Hathor to Download

To make the software download from the bolus:

1. Plug the antenna into the bottom of the handset, this will start the Hathor software
2. Choose the bolus you wish to download from by scrolling to its number.
3. Tap the **download button**.
4. The software will now attempt to establish a connection with the bolus.
5. Once a connection has been established, the handset will begin downloading data.
6. Once the download is complete the handset will set the time and date settings on the bolus to ensure accuracy.

Please ensure you maintain proximity to the cow even once the progress bar has reached 100% to allow the handset to set the bolus time.

Cow Handling

The practicalities of getting close enough to the cow to perform a full download may slightly complicate the process. Although methods used can vary from cow to cow due to differing temperaments, the fundamentals remain the same. What follows are some suggestions for successful downloading:

- If possible, do the download when the cows are being fed and are locked in yokes. This eliminates the possibility of them walking away.
- Depending on the type of parlour used it may be easier to perform the downloads during milking.
- It is usually best to perform the download on the cow's left hand side, standing near the front of the cow placing the antenna close to the left armpit of the cow.
- Best results are achieved by holding the handset between 1 and 2 metres from the cow.
- Some users report better downloads with the handset near the ground angled upwards towards the cow (for safety reasons this should only be done when the cow is restrained).

- Downloading may take longer when the cow is laying down due to the bolus being engulfed by the stomach contents. However, standing the cow up may stress her and cause her to walk away. As such it is usually best to leave the cow undisturbed during downloads



Downloading is made easier when the cow is locked in a yoke. Here, a student performs a download using a handset positioned by the cow's left point of elbow.

Troubleshooting Downloads

I can't get the handset to connect to the bolus, what should I do?

- A) Has the cow calved recently? After calving the rumen expands to refill the space left by the calf which causes a lot of internal movement. Users have reported not being able to connect to the bolus for a couple of days after calving. Wait for 3 to 5 days after calving to perform the next download and you should be able to connect.
- B) Check that the antenna is correctly plugged into the handset, as it may have been knocked loose. To do this, exit Hathor by pressing the back button (located to the right of the home button at the bottom of the handset) 3 times until you reach the home screen. Unplug the antenna and then plug it back in, firmly but also gently, and the Hathor software will restart automatically. Retry the download.
- C) Try repositioning the handset antenna. The left hand-side rule mentioned above is not universal and best positioning will vary from cow to cow. Remember, closer is not always better. There is a sweet spot between 1 and 2 meters from the cow in

which signal strength will be the strongest.

The download has frozen halfway through

- A) This is most likely due to a sudden loss of signal during the download. Cancel the download by pressing the back button (to the left of the home button) and start again. To prevent this from happening, ensure you maintain proximity to the cow.

Uploading Data

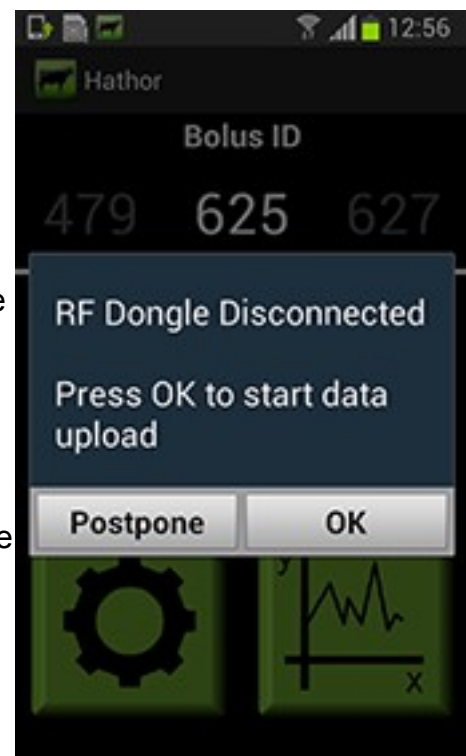
When you unplug the antenna after having downloaded new data the software will ask you whether you would like to upload the data now or postpone the upload. This feature was included since, at most farms, there will be no internet connection around the cows.

On the screen shown to the right, selecting OK will cause the handset to try an upload immediately – only do this if you know you have a reliable internet connection. Once you have pressed OK you will see a progress bar for the upload to the server followed by a message telling you it is uploading to an email address as well.

Selecting postpone will postpone the data upload until the phone is next connected to WiFi, at which time it will perform the upload automatically.

By default the data is sent to our eCow server and an eCow email address. This is for the purpose of archiving and analysis so the results may be presented to you through the Client Software. It is, however, possible to change where the data is being sent to. For example if you wanted a copy of the raw data sent to your personal email this would be possible.

If you request the raw data to be sent to your own email address you will receive a .csv (comma separated values) file. This is the format in which the handset downloads data from the bolus and is simply a large list containing all the readings along with relevant timestamps.



4. Viewing the Data

The eCow Client software (named HathorHB Client) has been designed to allow you easy access to your data. With it you can either download your results from our web server or import them directly from the handset. In order to run the Client software you must have a recent version of the Java Runtime Environment, which may be obtained from [here](#).

All versions of the client software are supplied with install instructions, please refer to them

to get the software up and running.

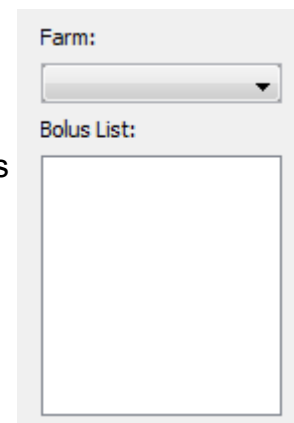
Getting to Grips with Client

When you open the Client software you will see that it may be divided into roughly 3 main sections. These are:

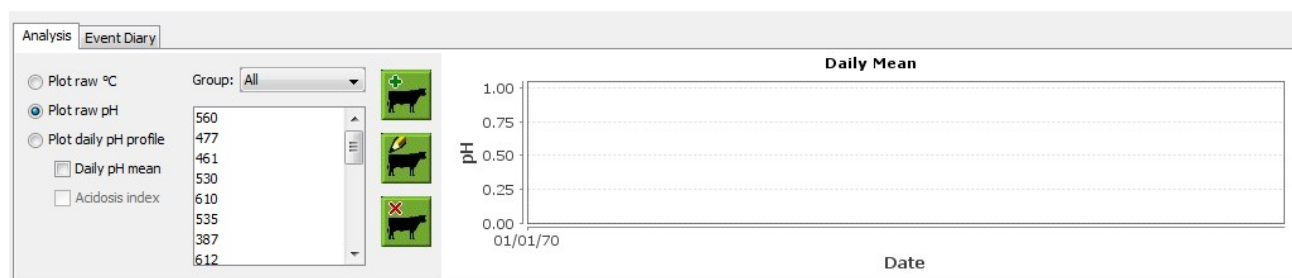
The Farm and Bolus Selection Box

This is at the bottom left of your screen. Once you have imported data from your handset or server you will be able to choose what Farm and what Bolus data you wish to view. If you only have access to data from one farm then the Farm list may not be necessary for you.

Selecting a Bolus from the bolus list will display that bolus's data on the graph.



The Analysis and Events Box



This section has two tabs at the top, one marked Analysis and another marked Events. By default the software opens with the analysis tab selected. In this view you can change between different types of graphs and analysis. To switch between pH, temperature or daily pH profile mean, click the circle beside your desired graph on the left.

Groups may also be created here, this is useful for grouping together certain cows who may all be on the same type of feed or housed in the same place. To create a group, click the button with a cow and a plus on in. Once you have created a group you can select it from the group drop down menu to view only those cows.

Towards the right you have the Daily Mean graph which shows a plot of the pH averaged over each successive 24 hour period in the data you are viewing.

Analysis

Event Diary

Event List:

13/10/201 MAS

+

-

Click on the diary entry to see the event description

Press '+' to add

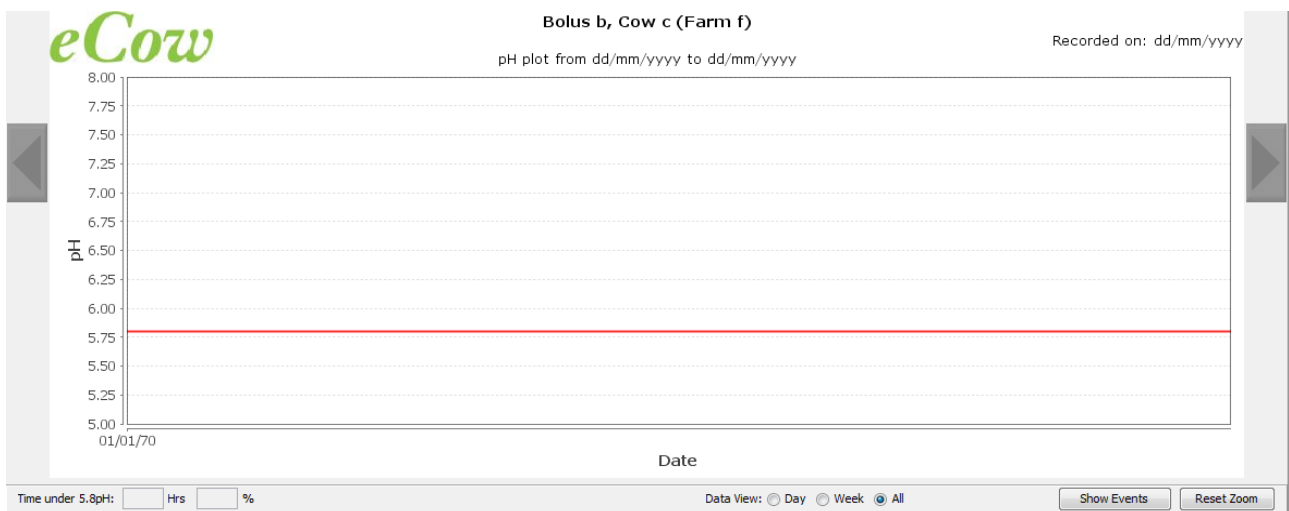
Press '-' to remove

Event Description:

Cow 980 (558) had Mastitis on 20/10

Selecting the Events Diary tab brings up the events view. In this view you can add and remove events to be plotted on your data graphs. This can be used to add events such as calving or illness to a graph which can help identify anomalous pH or temperature readings.

The Graph Section



This is the section in which you will see your data displayed. Starting at the top, you have the Graph title which is shown as “Bolus c, Cow c (Farm f)” in this is example. On the graph there is a red line which indicates the acidosis threshold (pH 5.8, below which the cow may be at risk of acidosis). In the bottom left there are two boxes which show how many hours the cow has spent underneath pH 5.8 as well as a percentage of time spent under the threshold.

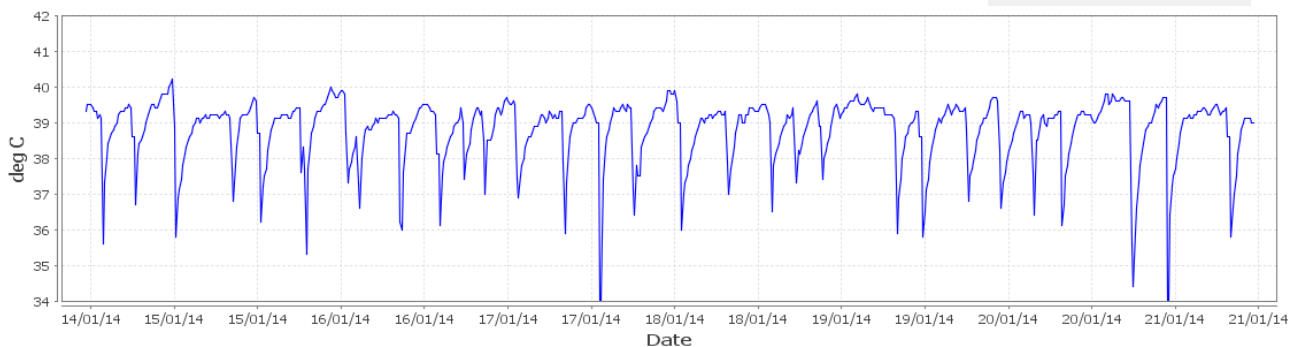
Towards the bottom right there are the options to change between Day, Week and All data views. Finally on the bottom right you have the buttons, Show Events and Reset Zoom. Pressing the show events button toggles whether the events are shown on the graph and pressing Reset Zoom returns you to the full overview of the data.

The Graphs

There are three different graphs available for each bolus; pH Summary, Temperature Summary and the Daily pH profile. To switch between these graphs use the buttons shown to the right (These are in the analysis tab of the Analysis and Events Box).

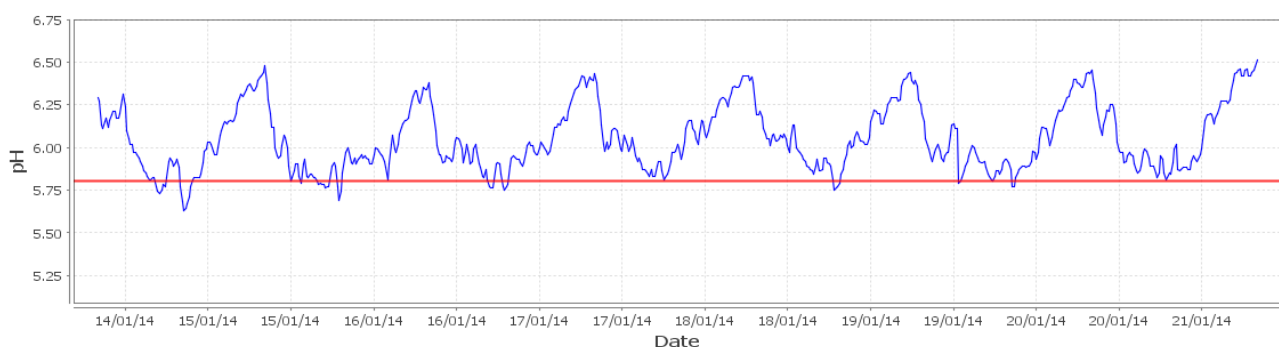
- ☐ Plot raw °C
- ☒ Plot raw pH
- ☐ Plot daily pH profile
- ☐ Daily pH mean
- ☐ Acidosis index

Temperature Summary



The Temperature Summary graph plots the temperature of your cow's rumen over a date range that may be customised. The graph shown above is from a typical cow over a period of a week. The sharp dips visible are the drops in temperature when a cow takes a drink, a typical cow may have anywhere between 3 and 7 drinks per day. Noticeable increases in temperature or lack of drinking events may signal an infection – consult your vet.

pH Summary



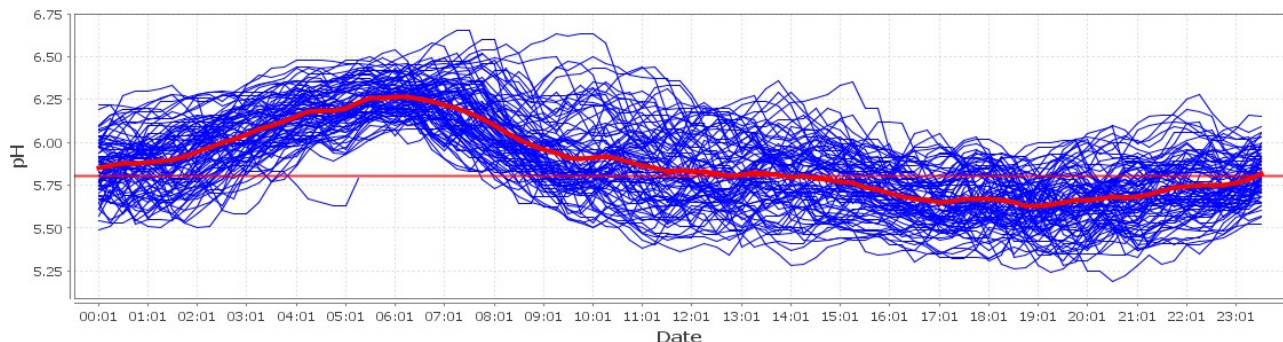
The pH summary graph is a very powerful diagnostic tool. Shown above is a pH summary graph for a cow fed each morning, this is seen as a peak in pH, which then falls after eating. The patterns seen in the pH summary graphs will vary depending on diet, regularity of feeding and the general health of the cows.

The red line on this graph is dubbed the “acidosis threshold” and is at pH 5.8. Beneath this threshold a cow is at an increased risk of falling sick with acidosis. To assess the acidosis risk check the amount of time your cow has spent under pH 5.8, which is given towards the bottom left of the graph in hours and as a percentage.

Please note that the threshold value of pH 5.8 is given as an indicator only. Having a cow with a rumen pH that is below 5.8 does not necessarily mean that she has acidosis.

Time under 5.8pH: 9.5 Hrs 5.6 %

Daily pH profile



The Daily pH profile is useful for analysing pH patterns over a long period of time. Each blue line represents 24hrs of data and the red line represents the average of all the blue lines. The graph shown above represents about 80 days of data, you can see that the cows are fed at roughly 6am every day.

Importing Data

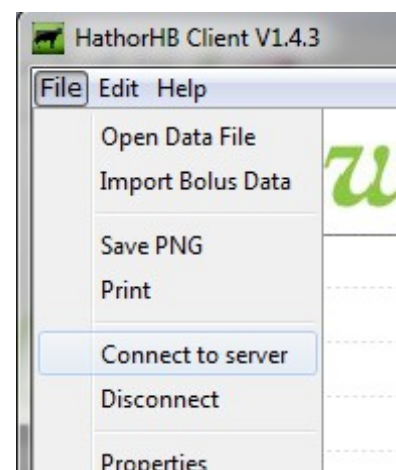
From saved files on your computer

The software enables you to view particular data files of interest that you may have saved on your computer. To do this:

1. Click File > Open Data File
2. Navigate to the file of interest (this must be a file downloaded from an eCow bolus).
3. Select this file and click Open.

From the Web Server

1. Click File > Connect to Server
2. This will bring up the Client Login box. Please use the username and password supplied to you by eCow to connect.
3. Once connected you will be able to select Farms from the drop down farm list.
4. After selecting a farm the software will take a few moments to download the



required data.

5. You will now see a list of boluses in the bolus selection box. Click on a bolus number to see the data plotted on the graph.

From the Handset

1. Plug your handset into your computer using the included USB cable
2. Click the Start icon and then click Computer.
3. You should see the Handset listed under the heading "Portable Devices" as a "GT-I9100". Double click this icon, then double click on phone on the following screen.
4. In this next screen you will see a number of folders, locate the one named "eCow"
5. Copy and paste the eCow folder to somewhere appropriate on your computer (perhaps create a new folder dedicated to eCow data).
6. Go back to the Hathor Client software and click File > Import Bolus Data.
7. Navigate to where you saved the eCow folder. Double click eCow, then double click Bolus.
8. You should now see a file called "bolusID.dat". Select this and then click the Open button.
9. The software will now import all the data for viewing.

Exporting Data

The Client software offers two easy methods of exporting your data to share with others.

Save PNG

A PNG (Portable Network Graphics) is a picture file that can be used for a wide range of applications. It is an easy way to export your eCow graphs in a format that can be used in presentations, documents and emails. To export a PNG:

1. Click File > Save PNG.
2. Choose a suitable name and location for your file.
3. Click Save

Printing

To print your graph:

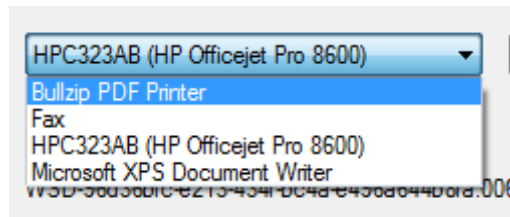
1. Click File > Print
2. This will bring up the Page Setup dialogue. It is recommended you leave the orientation in Landscape mode as portrait makes the graphs look squashed.

3. Click OK to bring up the Printer options.
4. Select the correct printer from the drop down list and click OK to start printing.

To PDF

To export a graph to pdf you will need to download and install the free tool [Bullzip PDF Printer](#). Once you have that installed, follow these steps:

1. Click File > Print
2. Click OK
3. Click on the drop down list of printers and select Bullzip PDF Printer
4. You will then see a screen where you can name your file and choose where to save it. Once you are satisfied with the name and location, click Save.



5. Warranty

All eCow products come with a 30 day no quibble warranty covering manufacturing faults. The warranty does not cover fair wear and tear or accidental damage.

If an eCow product appears to have broken down outside the 30 day warranty please contact eCow for advice.

Use inside other Animals

The warranty only covers use inside cows, use of the bolus inside any non-bovine animal will invalidate your warranty. The bolus should only be inserted into an animal by a trained technician; no liability is accepted for incorrect usage. Please ensure the animal technician has undertaken the correct training and certification process.

Dry Sensor

Do not let the sensor dry out; this is not fair wear and tear. The bolus should be kept in its six pack until used. The sensor should always be immersed in liquid of near neutral pH; tap water will do. The eCow boluses should be left in the plastic box in which they are shipped for periods of storage. They must be stored with the sensor head pointing downwards. Storing the boluses incorrectly invalidates the warranty.

Accidental Damage of the Handset

The handset must be treated with care. Whilst it is protected with by its large black cover it will not survive being manhandled and dropped on a regular basis. If the handset breaks down due to accidental or water damage this is not covered by the warranty.

Overheating the Device

Long periods of time spent over 45°C will damage the device's internal electronics. Similarly at temperatures above 30°C the device will deplete battery at an accelerated rate. For storing the boluses the recommended temperature range is between 5°C and 25°C.

Immersing the sensor in very hot water

As previously mentioned, immersing the sensor in boiling or near boiling water will break the sensor. This is not covered by the warranty

Returns

To make a warranty claim please phone eCow to receive further instructions.